

A NEW SPECIES OF *ASTRAGALUS* (FABACEAE) FROM THE WASATCH MOUNTAINS OF UTAH

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ABSTRACT

Astragalus kelseyae B.L. Corbin, sp. nov. is described as a new species from the central Wasatch Mountains, where it is known from only one small occurrence in Weber County, Utah. It grows in shale talus within the Gambel oak and bigtooth maple shrubland.

Key Words: *Astragalus*, Fabaceae, rare plant, Utah, Wasatch Mountains.

A new species of *Astragalus* is described from a single population in the foothills of the Wasatch Mountains in Weber County, Utah. This distinctive milkvetch's fruit shape and texture resemble some forms of *A. lentiginosus* Douglas ex Hooker, but plants differ in having a branching, subterranean caudex, a smaller fruit beak, and generally larger (and fewer) flowers and fruit. Its humistrate growth form and fruit shape resemble *A. amblytropis* Barneby, but it has firmer fruits and larger flowers. Its large pods are similar to *A. megacarpus* (Nutt.) A. Gray, and flowers and leaflets are similar to *A. beckwithii* Torr. & A. Gray, but it differs from both species by having bilocular fruit, shorter leaves, and larger flowers. It differs significantly from each of those species by having dolabriform (malpighian) hairs.

TAXONOMIC TREATMENT

Astragalus kelseyae B.L. Corbin, sp. nov. (Fig. 1)
— Type: USA, Utah, Weber Co., talus slope above Ogden, T6N, R1W, Sec 26, SLM, 41°14'N, 111°55'W, 1625 m (5340 ft) elevation, 28 May 2010, *Beth Lowe Corbin 1292* (holotype: UT; isotypes: NY, CIC, UVSC, to be distributed).

Planta similis *A. lentiginosus* Douglas ex Hooker var. *negundo* S.L. Welsh & N.D. Atwood et *A. amblytropis* Barneby in legumina biloculares et e var. *negundo* in caudices subterranis elongatis et e ambo in legumina cartilagineis nec chartaceis et pubescentiis dolabriformis differt.

Perennial herb from branched, subterranean, woody caudex branches. Above-ground stems 10–20 cm long, prostrate (Fig. 2). Leaves humistrate, 3.0–5.2 cm long, 1.5–3.0 cm wide, with (5) 7–11 (13) leaflets, the terminal jointed. Leaflets widely elliptical, 8–15 mm long, 6–12 mm wide, tips rounded to obtuse, more or less alternate on the rachis. Leaves and stems silvery green with appressed dolabriform hairs about 0.5–0.8 mm long. Stipules free, triangular, 4–5 mm long. Inflorescence 2–7 flowered, congested, not much

elongating in fruit. Peduncle 13–25 mm; flowering axis 5–10 mm. Calyx 13–16 mm long, 3.5–4.5 mm wide, with narrow teeth 3–4 mm long; calyx pinkish, with light and dark hairs. Petals white, with keel tip slightly purple. Banner 22–26 mm long, 9–11 mm wide, bent midway at about a 120° angle. Wings 19–21 mm long, narrow, slightly cupped. Keel 18–19 mm long. Fruit firm, cartilaginous, fleshy, inflated, bilocular, humistrate, sessile, with narrow and shallow dorsal and ventral grooves, not curved, sometimes red mottled. Fresh pod 35–53 mm long, 18–30 mm thick, 10–17 mm tall (dorsiventrally compressed), with a small beak 3–6 mm long, and short, dolabriform hairs. Dehiscence through the beak, after separation.

Paratypes (topotypes): 19 May 2009 *Beth Lowe Corbin 1235* (BRY), 4 September 2011 *Beth Lowe Corbin 1523* (UTC — to be distributed).

DISTRIBUTION AND HABITAT

Astragalus kelseyae grows on the lower, west/southwest-facing slope of the central Wasatch Mountains, on talus openings within *Quercus gambelii* Nutt. (Gambel oak) and *Acer grandidentatum* Nutt. (bigtooth maple) shrublands. The talus consists of fine-textured Ophir shale on about 50–60% slope, at about 1625 m elevation. This habitat is just above the old shoreline of the Pleistocene Lake Bonneville. Precipitation is about 51–64 cm (20–25 inches) per year. The site is within the Uinta-Wasatch-Cache National Forest. *Astragalus kelseyae* is known only from the type locality, where about 150–200 plants were seen in a localized area of about 0.1 ha. It was first found in 2009, and revisited in 2010 and 2011. A popular hiking trail bisects the occurrence, and additional undesignated trails occur within the habitat.

The geology of the Wasatch Mountains is a complicated mix of sedimentary, metamorphic (such as quartzite), and igneous deposits (Yonkee and Lowe 2004). Ophir shale is a Paleozoic era

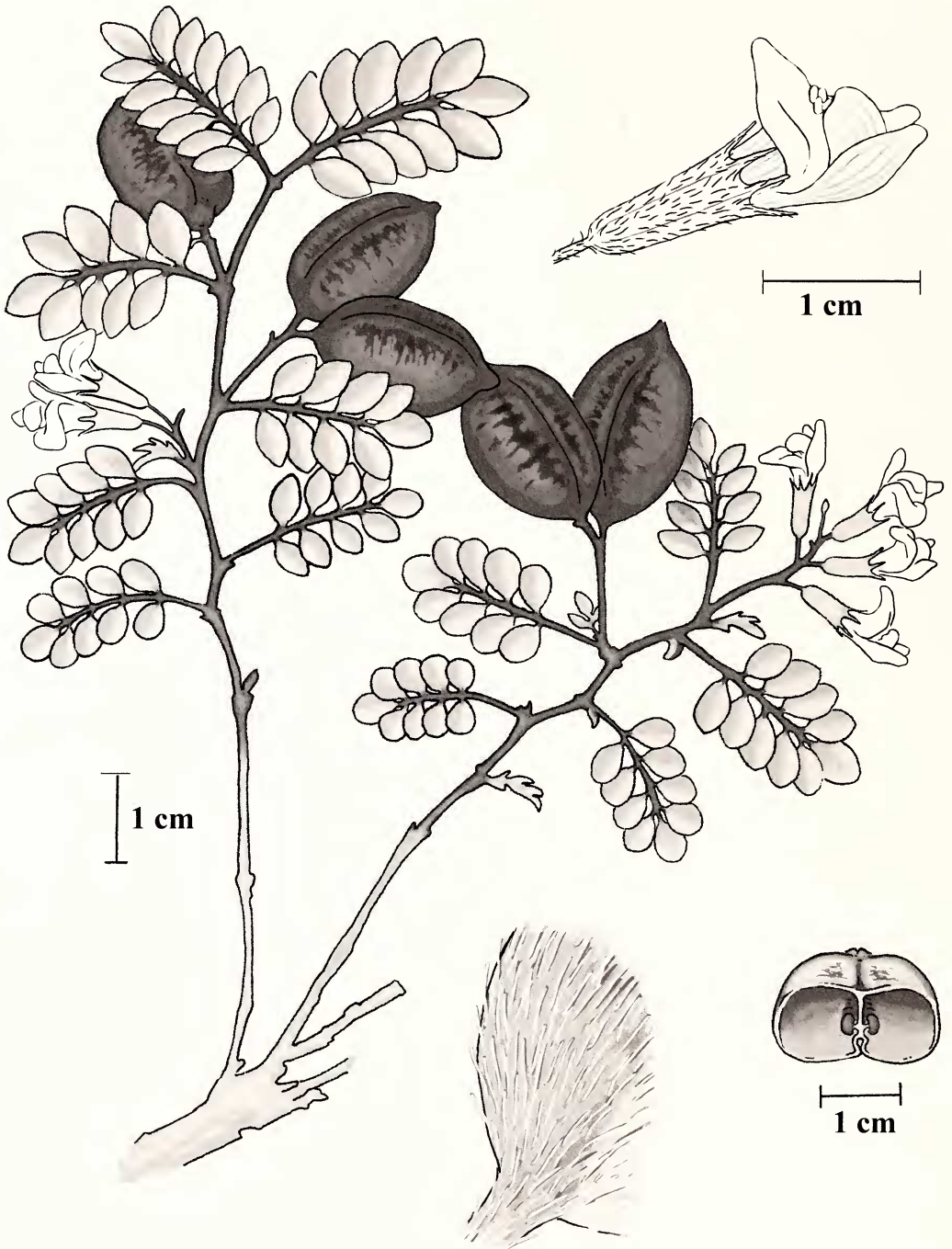


FIG. 1. *Astragalus kelseyae* habit, flower detail, pod cross section, and leaf hair detail.

sedimentary deposit. Bands of Ophir shale and other similar talus types occur in scattered locations across the Wasatch Front, and additional occurrences of *Astragalus kelseyae* may be found in the future.

The talus microsite is very open, with low cover by associates, including *Scutellaria angustifolia*

Pursh subsp. *micrantha* Olmstead, *Asclepias asperula* (Decne.) Woodson, *Apocynum androsaemifolium* L., *Epilobium canum* (Greene) P.H. Raven subsp. *garrettii* (A. Nelson) P.H. Raven, *Hedysarum boreale* Nutt., *Erysimum capitatum* (Douglas) Greene, *Eriogonum umbellatum* Torr., *Pseudoroegneria spicata* (Pursh) Á. Löve, *Ame-*



FIG. 2. *Astragalus kelseyae* in its shale talus habitat.

lanchier utahensis Koehne, and *Phacelia hastata* Douglas ex Lehm. Although no weeds occur directly with the *Astragalus*, several weedy species occur in the vicinity, including *Isatis tinctoria* L., *Linaria dalmatica* (L.) Mill., *Euphorbia myrsinites* L., and *Bromus tectorum* L., and pose a threat to this species.

RELATIONSHIPS

Astragalus kelseyae appears to have similarities to *A. lentiginosus*, *A. amblytropis*, *A. megacarpus*, and *A. beckwithii*, but differs significantly from each (S. Welsh, Brigham Young Univ., personal communication). Its pod resembles *A. lentiginosus* var. *negundo* with a large, bilocular fruit, but differs in having a less prominent beak, generally wider fruit, fewer flowers, a branched, subterranean caudex, and dolabriform hairs. It is similar to *A. amblytropis* in having a subterranean caudex, humistrate stems, leaves, and fruit, and somewhat similar fruit shape, but differs in having firmer pods, larger flowers, free stipules, and dolabriform hairs. It superficially appears similar to *A. megacarpus* or *A. oophorus* S. Watson with its large pods, and *A. beckwithii* with its white flowers, but differs from these species in the section *Megacarpis* by both its

bilocular fruit and dolabriform hairs. Thus, *A. kelseyae* differs from each of these species by the presence of dolabriform hairs, and other characteristics as shown in Table 1. The new species' resemblance to *A. lentiginosus* is likely due to independent parallel evolution, rather than a close relationship; the evolution of a fruit septum (and dolabriform hairs) does not necessarily imply shared ancestry with other species with these characters (J. Alexander, Utah Valley Univ., personal communication). Dolabriform hairs have apparently arisen independently in several sections within genus, but none of the other species with dolabriform hairs have large, bilocular pods, relatively few, large flowers, and prostrate stems. The combination of characteristics present in *A. kelseyae* appears unique.

Astragalus lentiginosus, with its plethora of varieties, is widespread, including Weber Co., Utah; var. *negundo* is known from Box Elder Co. (which is adjacent to the north side of Weber Co.) and Millard and Tooele counties (southwest of Weber Co.), Utah, so its range somewhat overlaps that of *A. kelseyae* (Welsh 2007). *Astragalus amblytropis* is limited to the vicinity of Challis, in Custer and Lemhi counties, Idaho, some 290 miles north of *A. kelseyae* (Welsh 2007). *Astragalus megacarpus* is known from Wyoming

TABLE 1. MORPHOLOGICAL COMPARISON OF *ASTRAGALUS KELSEYAE* AND SIMILAR SPECIES. Measurements (except *A. kelseyae*) come from Barneby 1989, Welsh et al. 2008, and Welsh 2007.

Character	<i>A. kelseyae</i>	<i>A. lentiginosus</i> var. <i>negundo</i>	<i>A. amblytropis</i>	<i>A. megacarpus</i>	<i>A. beckwithii</i>	<i>A. oophorus</i>
Pubescence	dolabriform	basifixed	basifixed	basifixed	basifixed	basifixed
Stem	humistrate; 10–20 cm; caudex subterranean	diffuse; 19–32 cm; caudex superficial	humistrate; 10–40 cm; caudex subterranean	subcaulescent; <5 cm; caudex superficial	decumbent to erect; (2) 7–35 (90) cm; caudex superficial	decumbent to ascending; 10–25 (30) cm; caudex superficial
Fruit	large, 3.5–5.3 cm long; inflated; firm; bilocular; rounded at base; beak short	smaller, 2.3–3.4 cm long; moderately inflated; stiffly papery; bilocular; rounded at base; beak longer	smaller, 2–3.5 cm long; inflated; papery; bilocular; rounded at base; beak short	large, (3.5) 4–7 (7.5) cm long; inflated; papery; unilocular; rounded at base; beak short	smaller, (1.5) 1.9–3.2 (3.7) cm long; narrower; firm; unilocular; pointed at base; beak longer	large, (2) 3–5.5 cm long; inflated; papery; unilocular; rounded at base; beak short
Flowers	white; banner 22–26 mm; calyx 13–16 mm	whitish (to purple); banner 14–21 mm; calyx 8–12.5 mm	yellowish; banner 6.4–8.3 mm; calyx (2.8) 4–5 mm	pink-purple (to white); banner 16–22 mm; calyx 8.5–14 (16) mm	ochroleucous, whitish, to pink-purple; banner 16.5–21 mm; calyx 7–13.5 mm	white to reddish purple; banner 11–23 mm; calyx 6–12 mm
Inflorescence	2–7 flowered	5–11 flowered	(4) 6–10 (13) flowered	3–5 (8) flowered	(3) 4–10 (14) flowered	(3) 4–10 (14) flowered
Leaves	3–5.2 cm long; (5) 7–11 (13) leaflets; humistrate	(2.5) 4–11 cm long; (7) 13–19 leaflets; spreading	1–3 (4.5) cm long; 9–13 leaflets; humistrate	(2) 5–17 cm long; (7) 9–15 leaflets; stiffly erect	(2) 4–15 cm long; (7) 11–27 leaflets; spreading	(3) 5–15 (21) cm long; 7–25 leaflets; spreading

(at least 50 miles east of this occurrence), central Utah (about 120 miles south), Nevada, and Colorado, while *A. beckwithii* occurs in Weber Co. and generally to the west in Utah, and in Idaho, Nevada, Oregon, Washington, and British Columbia (Albee et al. 1988; Welsh et al. 2008; Shultz et al. 2010; USDA 2010). *Astragalus oophorus* occurs mostly in the southern Great Basin, east into western Colorado, but is also recorded from northwest Utah (Box Elder and Tooele counties) (Welsh et al. 2008; USDA 2010). Thus, the location of *A. kelseyae* is at the east edge of the ranges of *A. lentiginosus* var. *negundo* and *A. beckwithii*, close to the northern edge of the ranges of *A. megacarpus* and *A. oophorus*, and disjunct from *A. amblytropis*.

Astragalus kelseyae is named in honor of Ann Kelsey, plant collection manager for the University of Utah, with whom I've spent many pleasant field days in the mountains and deserts of Utah.

This plant is of conservation concern because only one occurrence with few individuals is known, and because potential threats exist from trails and invasive weeds.

KEY TO SIMILAR SPECIES

(adapted from Barneby 1989 and Welsh 2007)

1. Hairs dolabriform; pods fully bilocular . . . *A. kelseyae*
- 1'. Hairs basifixed; pods unilocular or bilocular
2. Pods unilocular
3. Pod 1.5–3.7 cm long, valves leathery. *A. beckwithii*
- 3'. Pod (2) 3–6 (7.5) cm long, valves papery
4. Plants subcaulescent, stems 1–5 cm long. *A. megacarpus*
- 4'. Plants caulescent, stems mostly 5–20 cm long *A. oophorus*
- 2'. Pods bilocular
5. Stipules connate; caudex deeply subterranean *A. amblytropis*
- 5'. Stipules free; caudex superficial (near soil surface) *A. lentiginosus*

ACKNOWLEDGMENTS

I thank Stanley Welsh (Brigham Young University, BRY) for detailed information, the Latin diagnosis, and access to the herbarium. I also thank Stephen Clark (Weber State University, WSCO), Don Mansfield (College of Idaho, CIC), Michael Piep (Utah State University, UTC) and Ann Kelsey (University of Utah, UT) for access to collections. Jason Alexander (Utah Valley University) provided helpful comments and insights. Dan Scott produced the illustration, which was funded by the Intermountain Region of the U.S. Forest Service, thanks to Teresa Prendusi, who also reviewed a draft of this article, as did Don Mansfield. This paper was also improved by reviews from Stanley Welsh and Leila Shultz; however, any mistakes are all mine.

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